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ABSTRACT

Japanese management practices have attracted much interest in the United States. The case of quality circles (QCs) common in Japan, has been considered a promising approach to improving American workers' productivity. A quality circle is made up of workers from the same group who meet to discuss quality problems, recommend solutions, and implement improvements. In-process goals of QCs include immediate feedback, improvements, and modifications of policies; end-product goals deal with cost-savings, improved quality, and higher productivity. This study examined the in-process goals of 47 quality circles over a 3-year period in a quasi-experimental field study in a Tennessee fabrication and assembly plant. The dependent variables were the quantity of QC presentations and the speed of problem-solving. These two dependent variables were examined as a function of upper-management support (high versus low), QC initiation (management-initiated versus self-initiated), and collar color (white versus blue) in a 2 x 2 x 2 multiple analysis of variance. The results showed that QCs with a high level of upper-management support solved their problems significantly faster than did those QCs with a low level of support. Management-initiated QCs solved their problems significantly faster and solved more problems than did self-initiated QCs. Self-initiated QCs with a low level of upper-management support had a slower speed of problem-solving. Further, self-initiated QCs with white collar workers also had a slower speed of problem-solving. A six-page reference list and three data tables conclude the document. (ABL)

Quality Circle Effectiveness as a Function of Upper-Management Support, Circle Initiation, and Collar Color

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Abstract

The effectiveness of 47 quality circles (QCs) over a three-year period was examined in a quasi-experimental field study. The dependent variables were the quantity of QC presentations and the speed of problem-solving. These two dependent variables were examined as a function of upper-management support (high vs. low), QC initiation (management-initiated vs. self-initiated), and collar color (white vs. blue) in a 2 x 2 x 2 MANOVA. The results showed that QCs with a high level of upper-management support solved their problems significantly faster than did those QCs with a low level of support. Management-initiated QCs solved their problems significantly faster and solved more problems than did self-initiated QCs. Self-initiated QCs with a low level of upper-management support had a slower speed of problem-solving. Further, self-initiated QCs with white-collar workers also had a slower speed of problem-solving.

Quality Circle Effectiveness as a Function of Upper-Management Support, Circle Initiation, and Collar Color

Japanese management practices have attracted a lot of interest in the U.S. (e.g., Hatvany & Pucik, 1981; Ouchi, 1981; Pascale & Athos, 1981; Takeuchi, 1981). Moreover, quality circles (QCs), in particular, have been considered one of the most promising approaches to improving American workers' productivity (e.g., Blocker & Overgaard, 1982; Ferris & Wagner, 1985; Gryna, 1981). A quality circle (QC) is a group of workers from the same group "who usually meet for an hour each week to discuss their quality problems, investigate causes, recommend solutions and take corrective actions when authority is in their purview" (Reiker, 1983, p. 1).

In-Process vs. End-Product Goals

Gibson (1981), Orfan (1981), and Thompson (1980) suggested that distinctions should be made between in-process and end-product goals. The in-process goals which are related to the operations and functions of the QCs can be used for immediate feedback, improvements, and modification of the administrative policies (Tollison, 1986a, 1986b). On the other hand, end-product goals deal with cost-savings, improved quality, higher productivity, job attitudes, and safety. Recently, many studies examined the "end-product" goals of QCs (e.g., Berger & Holcomb, 1985; Holcomb & Berger, 1986; Marks, Mirvis, Hackett, & Grady, 1986; Rafaeli, 1985; Shelby & Werner, 1980; Yager, 1981; Zemke, 1980). However, very few studies examined the "in-process" goals of QCs (cf. Keefe & Kraus, 1982).

In the present study, the in-process goals of QCs were examined in a quasi-experimental field study. More specifically, the major purpose of the present study was to examine the quality circle (QC) effectiveness as a

function of upper-management support (high vs. low), QC initiation (management-initiated vs. self-initiated), and collar color (white vs. blue) using a 2 x 2 x 2 MANOVA.

Upper-Management Support

One of the many variables most often cited as critical to the success of QCs is management support (e.g., Cole & Tachiki, 1983; Gison, 1981; Goodman, 1983; Ingle, 1982; Reiker, 1983; Wayne, Griffin, & Bateman, 1986). Concern for employees or management support has significant impacts on the behavior of groups (e.g., Argyris, 1964; Herzberg, 1966; Latham & Saari, 1979; Likert, 1967; McGregor, 1960; Roethlisberger & Dickson, 1939).

The present authors reasoned that if the management of an organization supports the QC program, most upper-level managers would attend QC support (steering committee) meetings regularly. Steering committee attendance over time is also "an indicator of the priorities the individual may have set in their day-to-day management activities" (Tollison, 1986b, p. 88). Moreover, management personnel would be able to offer their knowledge, expertise, information, and related resources to these QCs and help them select, coordinate, and solve QC-related problems.

Further, "top management involvement in the Quality Circle program is essential in setting up the policy and guidelines" and "helps to promote more funding, participation, guidance, and cooperation throughout the company" (Ingle, 1982, p. 58, emphasis added). It was also reasonable to believe that upper-level managers would have the most "power" (cf. French & Raven, 1959) in an organization. Therefore, the present authors proposed that QCs with a high level of upper-management support (high support QCs) would have a higher level of effectiveness than would those low support QCs. According to Steers (1984),

"effectiveness is the extent to which operative goals can be attained" (p. 22). In the present study, QC effectiveness variables (i.e., the quantity of QC presentations and the speed of problem-solving) were examined. The following hypothesis was proposed:

H1: High management support QCs would have a higher level of QC effectiveness than would low management support QCs.

QC Initiation

The second independent variable examined in the present study was QC initiation, i.e., self-initiated vs. management-initiated QCs. The present authors argued that workers in management-initiated QCs and self-initiated QCs may experience different types of "business environment", "values", and "culture" in the same organization (cf. Deal & Kennedy, 1982; Schein, 1986). Moreover, groups tend to develop their conceptual system, or, a common set of rules for relating to the environment and each other. There is an important difference between the management-initiated QCs and self-initiated QCs.

Perceived Demand Characteristics. The major difference between management-initiated and self-initiated QCs is related to the perceived demand characteristics (PDC) (cf. Orne, 1962; Salomon, 1984). Salomon (1984) argued that one factor which affects the amount of invested mental effort is a person's perceived demand characteristics (PDC) of the stimulus, task, or context. The more demanding PDC is, the greater mental effort will be expended.

Employees are hired to perform tasks for an employer. One of employees' "mental sets" in an organization is: "What do you want me to do?" (cf. Locke, 1978). Therefore, within the context of our culture, individuals have their "role expectations" (Orne, 1962, p. 777).

According to the goal-setting literature, specific, "difficult" goals will produce higher performance levels than either "easy" goals, "do your best" goals, or no goals at all (e.g., Locke, 1968; Locke, Shaw, Saari, & Latham, 1981). The harder goal would be achieved by expending greater effort and attention than would be expended to achieve the easy goal (Locke et al., 1981). Moreover, difficult goals also produce relatively high levels of "arousal" (Wright & Brehm, 1984). Dossett, Latham, and Mitchell (1979) also suggested that the "fear of negative consequences for failure to attain a goal may have been greater in the assigned than in the participative condition" (p. 297). Shalley and Oldham (1985) also suggested that external constriants, such as difficult goals, substantially increase "extrinsic" motivation and slightly decrease intrinsic motivation.

In the present study, no objective, measurable goals had been set for either management-initiated QCs nor self-initiated QCs. Management-initiated QCs were told at the outset that the management had chosen their area for placment of a circle and they were expected to identify and solve work-related problems. Those in the self-initiated QCs requested the opportunity to solve work-related projects. However, it is plausible that the press for performance differs according to how a QC is launched. It can be argued that the culture and role expectations of "management-initiated" QCs are very similar to that of the "assigned goals" condition, whereas those of "self-initiated" QCs are very similar to that of "do your best" or "no goal" conditions.

Based on the present review of the literature, the present authors proposed that workers in management-initiated QCs would experience a significantly higher level of PDC, explicit role expectations, arousal, and fear of negative consequences for failure than would those in self-initiated

QCs. That is, workers would be highly influenced (relatively speaking) by their extrinsic motivation rather than their intrinsic motivation. All these factors may lead workers in management-initiated QCs to exert "greater effort and attention" and work harder to solve their QC-related problems than those in self-initiated QCs (cf. Locke et al., 1981; Salaman, 1984). It was predicted that workers in management-initiated QCs would have higher problem-solving performances than would those in self-initiated QCs.

H2: Management-initiated QCs would have a higher level of QC effectiveness than would self-initiated QCs.

Ronan, Latham, and Kinnel (1973) suggested that the effects of goal setting depend on the extent to which subjects were closely supervised. Further, Latham and Locke (1979) stated that "setting a specific production goal combined with supervisory presence to ensure goal commitment will bring about a significant increase in productivity" (emphasis added, p. 70). It should be pointed out that managers' close supervision and supervisory presence were not the same as upper-level steering committee attendance. However, it was reasoned that the lack of such upper-management support might lead to a lower level of productivity (i.e., H1). Recently, a procedure to test ordinal interactions was suggested by Bobko (1986). This procedure is appropriate to use, when a high level of variable A combined with a high level of variable B will lead to the highest level of the dependent variable. Based on H1, H2, and Bobko's (1986) suggestion, it was predicted that the combination of self-initiation and a low level of upper-management support would lead to the worst QC effectiveness among four groups.

H3: Self-initiated/low support QCs would have the lowest level of QC effectiveness among the four groups.

Collar Color

The third independent variable examined in the present study was collar color. Many studies suggested that for high-level (white-collar) occupations, feelings about the job are derived from "job content" (motivator) factors, whereas for low-level (blue-collar) occupations, job satisfactions are derived from "job context" (hygiene) factors (cf. Armstrong, 1971; Darley & Hagenah, 1955; Friedlander, 1965; Harris & Locke, 1974; Herzberg, Mausner, Peterson, & Capwell, 1957; Herzberg, Mausner, & Snyderman, 1959).

At first, statistical QC methods were directed toward the inspection departments of the various industries (Hasegawa, 1983). Educational efforts explaining the methods were expanded to include management, foremen, then floor workers. The statistical process control techniques were more directly related to the quality of production. Therefore, QC programs originally were designed for blue-collar workers. Only recently were QC programs applied to white-collar workers.

Marks et al. (1986) stated that although directed toward solving job-related quality problems, "QC activities are expected to lead also to improved working conditions and greater opportunities for expression and self-development for participating employees" (p. 61). Thereby, QC programs may satisfy workers' intrinsic and extrinsic needs. Because of the lack of a clear rationale for this hypothesis, the present authors would regard the "collar color" issue as an interesting exploratory topic.

Holcomb and Berger (1986) suggested that there was a trend toward higher satisfaction and positive attitudes with increasing length of service. It was plausible that QC tenure might have an effect on QC effectiveness. Thus, a separate MANOCOVA using QC tenure as a covariate was performed in order to

determine the extent to which QC tenure would influence QC effectiveness.

Method

Subjects

The present study was conducted in a middle Tennessee structures fabrication and assembly plant over a three year period. The facility employed approximately 3200 when this present research project began and over 4600 at its conclusion. At the conclusion of the project, there were 316 employees (6.8% of the total work force) involved in 53 QCs.

The average age of employees involved in QC was 36.8 years. QC members' educational level varies from grade school to graduate degrees with an average of 13.12 years of school. The average tenure of QC members with the company was 6 years. The range of circle size varies from 3 to 20 members with an average of 8.5 members per circle over the three-year period.

Since several new QCs (n = 6) had not completed any QC project, these QCs were not included in our data analyses. Of the 47 QCs, 18 were self-initiated and 29 were management-initiated. Eleven circles represented white-collar occupations and 36 circles represented blue-collar occupations. These variables were not manipulated by the researchers.

Independent Variables

The three independent variables examined were management support, QC initiation, and collar color. In the present study, "management support" was operationally defined as follows:

The percentage of attendance at steering committee meetings (i.e., the proportion of meetings attended by people from upper management) reflected upper-management support and was obtained from steering committee minutes. The data on each specific vice president was coupled with the data of QCs falling

into his or her area of responsibility. The range of scores for upper-managment support varied from 40.39% to 89.80%. A median split was employed to divide upper-management support into high and low support groups. The cut-off score was 78.

Circle formation, the second independent variable, has two categories. Self-initiation was defined as any functional circle which was formed at the request of one or more members of the work group. Management-initiation was defined as any functional circle which was formed at the request of the work group's supervisor, manager, director, or vice-president.

The third independent variable was collar color. Categories of white- and blue-collar were determined by the existing salary structure of the facility. Occupations which were covered by the collective bargaining agreement were considered blue-collar. No unskilled groups were involved in the QC activity. White-collar occupations were broadly defined in reference to the Fair Labor Standards Act of 1938, as amended, and its application to Federal contractors.

Dependent Variables

The dependent measures of QC effectiveness were: (1) the number of QC problems solved (the quantity of QC presentations) and (2) the amount of time, as expressed in manufacturing days, required for QC problem-solving (the speed of problem-solving). The number of projects per QC were retrieved from facilitators' cumulative project status reports. The reports were updated monthly and reflected project starts and management presentations. The number of projects per QC were counted only if they had been brought to management presentation. The same report was used to determine the speed of problem-solving, i.e., the number of manufacturing days which had elapsed between the time a QC chose to work on a project and the time that they

presented their recommendations to management. Finally, QC tenure was defined as the length of time the circle had existed, as expressed in manufacturing days.

Results

The means, standard deviations, and correlations among variables are presented in Table 1. The two dependent variables were analyzed using a multivariate analysis of variance (MANOVA) with two levels of management support (high vs. low), two levels of QC initiation (self vs. management), and two levels of collar color (white vs. blue). A separate MANOCOVA was also performed using QC tenure as a covariate. Significant results were further analyzed by ANOVAs.

Insert Table 1 about here

Management Support

Hypothesis one predicted that high management support QCs would have a higher level of QC effectiveness than would low management support QCs. The results of a MANOVA showed that the main effect of upper-management support had a significant impact on QC effectiveness, F (2, 39) = 4.18, p = .023, Wilks lambda = .82. The main effect of upper-management support was again significant in a MANOCOVA, F (2, 38) = 3.90, p = .029, Wilks lambda = .83.

Univariate F-tests showed this difference to reside in the amount of time required to solve QC problems, F (1, 40) = 8.31, p = .006. That is, QCs with a high level of upper-management support tended to solve their problems faster (M = 85.95 days) than QCs with a low level of upper-management support (M = 127.66 days).

QC Initiation

It was predicted that management-initiated QCs would have a higher level of QC effectiveness than would self-initiated QCs. The main effect of QC initiation was significant, F (2, 39) = 8.62, p = .001, Wilks lambda = .69; F (2, 38) = 9.88, p = .000, Wilks lambda = .66; for MANOVA and MANOCOVA, respectively. Further analyses suggested that management-initiated QCs solved their problems significantly faster (M = 82.84) than did self-initiated QCs (M = 132.67), F (1, 40) = 15.95, p = .000. Moreover, management-initiated QCs solved significantly more QC problems (M = 3.69) than did self-initiated QCs (M = 2.11), F (1, 40) = 5.07, p = .030.

Management Support and QC Initiation

It was also hypothesized that self-initiated/low support QCs would have a lower level of QC effectiveness than would QCs in other groups. The interaction effect of upper-management support and QC initiation was significant in a MANOVA, F (2, 39) = 4.22, p = .022, Wilks lambda = .82. Further univariate F-tests revealed that the interaction effect had a significant impact on the speed of problem-solving, F (1, 40) = 7.76, p = .008. The same pattern of interaction effect was found in a MANOCOVA, F (2, 38) = 4.43, p = .019, Wilks lambda = .81. The means of the interaction effect are presented in Table 2.

Insert Table 2 about here

The procedure suggested by Bobko (1986) was used to examine the differences among the four means. Bobko (1986) suggested that "to infer the particular ordinal interaction of interest, one would require both a

significant result for Contrast 2 and a demonstration that the remaining three means were statistically equivalent" (p. 325). First, a one-way ANOVA was conducted to examine the differences among the three groups (i.e., high upper-management support/self-initiated QCs, high upper-management support/management-initiated QCs, and low upper-management support/management-initiated QCs). The results showed that the differences among the three were not significant, F (2, 39) = 1.73, p = .10. Second, the result of a planned comparison t test (Contrast 2) showed that self-initiated QCs with a low level of upper-management support spent significantly more time to solve their problems (M = 211.47) than did the average of the other three groups (M = 90.13), t (39) = 5.32, p < .01. Therefore, the combination of self-initiation and a low level of upper-management support had a significant impact on QCs' speed of problem-solving.

Collar Color

Collar color was treated as an interesting exploratory topic. The results showed no significant main effect, F (2, 39) = .77, p = .469, Wilks lambda = .96; F (2, 38) = 1.03, p = .366, Wilks lambda = .95; for MANOVA and MANOCOVA, respectively.

QC Initiation and Collar Color

Since the issue related to collar color was an exploratory one, no formal prediction was made concerning the interaction effect between QC initiation and collar color. The interaction effect was significant, F (2, 39) = 15.18, p = .000, Wilks lambda = .56; F (2, 38) = 16.53, p = .000, Wilks lambda = .53; for MANOVA and MANOCOVA, respectively. The means of the interaction effect are presented in Table 3.

Insert Table 3 about here

The results of the simple-main effects test showed that for white-collar workers, self-initiated QCs had a slower speed of problem-solving than had management-initiated QCs, F (1, 43) = 21.63, p = .000. For blue-collar workers, the difference was not significant, F (1, 43) = .89, p = .351. For self-initiated QCs, white-collar workers solved their problems slower than did those blue-collar workers, F (1, 43) = 10.52, p = .002. On the other hand, for management-initiated QCs, the difference failed to reach significance, F (1, 43) = 1.09, p = .303. Further, there were no significant differences among the three groups (i.e., white-collar/management-initiated QCs, blue-collar/self-initiated QCs, and blue-collar/management-initiated QCs) according to a one-way ANOVA, F (2, 40) = .66, p = .524. The results of a t test (LSD) suggested that white-collar/self-initiated QCs had a slower speed of QC problem-solving than the average of the other three groups (M = 84.87), t (39) = 7.54, $p < .01$.

Correlational Data

Since the independent variables examined in the present study were not manipulated, the correlations among these variables were examined. The results of Table 1 showed that upper-management support was significantly correlated with collar color (white-collar = 0, blue-collar = 1, dummy coding) and QC initiation (self-initiation = 0, management-initiation = 1, dummy coding). It appears that upper-level managers have attended more QC support meetings if the QCs are management-initiated or have blue-collar workers. However, no significant correlation was found between QC initiation and collar color.

QC tenure was significantly associated with the quantity of presentations

and management-initiation. The quantity of presentations and speed of problem-solving, our dependent variables, were negatively correlated. Moreover, management-initiation was associated with a longer tenure, more QC presentations, and a high speed of problem-solving. Blue-collar QCs were associated with a high speed of problem-solving.

Discussion

In the present study, the results showed that upper-management personnel had a strong impact on QC effectiveness. It appears that upper-management personnel's attendance at QC steering committee meetings may enable these managers to have a better understanding and knowledge of QC projects, to provide information, resources, and possible solutions to QCs problems, to set up "policy and guidelines" (cf. Ingle, 1982), to provide a role model for QC members, and to have the opportunity to show their commitments to QC projects. A high level of understanding and commitment from upper-management may have helped QCs reduce the amount of time needed to solve QC problems. Moreover, a high level of visible support from upper-management may have created a high level of perceived demand characteristics (cf. Salomon, 1984), thus QC members exert a high amount of effort and work hard on QC projects.

It is possible that upper-management support may have provided QC members an opportunity to satisfy their intrinsic and/or extrinsic needs (cf. Marks et al., 1986). However, it is also possible that these managerial behaviors may themselves be a product of QC performance and members' involvements and not necessarily a cause of it. The present data further support the notion that management support is an important ingredient of QC effectiveness, upper-management support in particular (e.g., Cole & Tachiki, 1983; Gibson, 1981; Goodman, 1983; Ingel, 1982; Latham & Saari, 1979; Lawler & Mohrman, 1985;

Reiker, 1983).

In the present study, only upper-management support was examined. Lawler and Mohrman (1985) also suggested that resistance by "middle management" is one of those many destructive forces related to QCs' failure (p. 68). Future research should also examine different forms of management support, such as, middle-management support, lower-management support, the amount of time required for the management to accept QC projects, and the amount of time required for the management to implement QC projects. More research is needed in this area.

Management-initiated QCs solved their problems significantly faster and solved significantly more problems than self-initiated QCs. It is speculated that management-initiated QCs may have experienced a different type of "culture" (cf. Deal & Kennedy, 1982; Schein, 1986), i.e., a higher level of PDC (cf. Salomon, 1984), fear of negative consequences for failure (cf. Dossett et al., 1979), and a more specific and clear goal (Locke et al., 1981) than those in self-initiated QCs. A greater amount of mental effort leads to a higher speed of QC problem-solving. It is suggested that members' subjective perceptions and feelings concerning their problem-solving process in management- and self-initiated QCs should be examined in future studies.

It is reasoned that if solving QC-related problems is the major concern of the organization, then, management-initiated QCs should be used. However, Lawler and Mohrman (1985) and Sims and Dean (1985) have considered self-managing work teams the logical extension of quality circles. Following this line of thinking, then, the management of an organization should encourage workers to organize their own QC teams and create a more participative "culture" in the organization. More research is needed to examine the effect

of self- vs. management-initiation on QC effectiveness and member participation.

Using the procedure suggested by Bobko (1986), the present study shows that the combination of low management support and self-initiation leads to the worst performance in terms of the speed of problem-solving. Therefore, the results of Ronan et al. (1973) and Latham and Locke (1979) are supported indirectly by the present data.

The results of the present study also suggest that the combination of white-collar QCs with self-initiation leads to the slowest speed of problem-solving. The differences between blue-collar QCs and white-collar QCs were also examined further as follows: First, the titles of QC projects were examined. Some examples of QC projects completed by blue-collar workers were: solve technical problems of milled "pad" not matching upper and lower parts; reduce non-productive time spent in arranging wooden planks that workers walk on to work on the wings; install safety hooks on the chain hoists used to lift heavy parts; install additional lights on drills to facilitate machine operation; fix leaks of several air hoses; reduce defects and scrap in the work area; install dust collection system to collect aluminum dust; install water fountain and air conditioners; etc. On the other hand, some examples of QC projects completed by white-collar workers were: develop miscellaneous listings for the phone book; develop a system to reduce the time that employees are out of the work area at starting and quitting time; set up procedures for the maintenance and the use of a copier; institute periodic meetings with the management; develop a handbook for material control coordinators; change purchase order forms; etc.

It appears that most of blue-collar QCs' projects are related to workers'

immediate work environment, safety, procedure, equipment, material handling, products, waste, etc., whereas white-collar QCs' projects are mostly related to procedure, rules, long-term planning, forms, paper wor tc. These results further supported previous findings in that blue-collar workers are more concerned about job context (hygiene) factors than white-collar workers (e.g., Armstrong, 1971; Harris & Locke, 1974; Locke, 1973). It can be stated that white-collar QCs are not necessarily less effective than are blue-collar QCs, but rather, the nature of the projects completed by white-collar QCs is different from that of blue-collar QCs.

Second, it is also possible that blue-collar workers are more interested in solving these hygiene-related problems. On the other hand, white-collar workers do not seem to have serious problems related to these hygiene factors. Blue-collar workers may also want to have greater opportunities for expression and self-development than white-collar workers (cf. Marks et al., 1986). Some of these needs may be satisfied by attending QC meetings and related activities.

Third, most of these blue-collar workers are paid by the hour. If blue-collar workers participate in QC meetings, they are not required to catch up the work they have missed outside the parameters of a normal work day. Borrowing the terms used in equity theory (cf. Adams, 1965), blue-collar workers may want to maximize their outcomes in evaluating exchange relationships by reducing their inputs in the actual production area. It is possible that some workers may consider QC meetings as a regular, weekly one-hour break. For blue-collar workers, attending QC meetings may mean less regular production work. On the other hand, white-collar workers have to make a choice between either going to a QC meeting or doing their regular work which

needs to be completed regardless of whether they go to QC meetings or not. For white-collar workers, attending QC meetings may mean extra work.

Fourth, it should be pointed out that upper-level managers offer more support to blue-collar QCs than they do to white-collar QCs. Thus, blue-collar QCs may also experience a higher level of PDC and intrinsic and/or extrinsic motivation than white-collar QCs. Some differences between blue-collar and white-collar QCs may be caused by the possible intended and/or unintended bias of the upper-management in the organization.

Finally, white-collar workers may experience more distractions and interruptions at work, thus inhibiting their attendance at QC meetings. They may also work on problems that take longer to solve, or they may find QC meetings not nearly as novel or interesting as blue-collar workers might, since white-collar workers generally experience more meetings than blue-collar workers.

In the first several years of QC operations, workers, blue-collar workers in particular, are probably trying to improve their quality of work life or "hygiene" factors of their jobs (cf. Herzberg et al., 1959). It is believed that these types of behavior may be motivated by certain variables. When the "hygiene" related problems are being solved, then, employees of QCs may move on to other types of quality-related problems. At that time, it is expected that a different set of variables may become important to QC operations.

Goodman (1983) expressed concern that very little effort has been given to the problems of maintaining a program over time. Cole and Tachiki (1983) reported that quality circle activity in Japanese chemical industries has declined significantly over the years. Recently, six phases of a QC's life and destructive forces related to each of these phases were discussed by Lawler and

Mohrman (1985).

Fujita (1983) outlined some of the weaknesses and new problems the Japanese circles faced after two decades of operation. Management is finding it more and more difficult to attract workers to circles and many workers are going through the motions simply to "keep management off their backs" (Fujita, 1983). Future research should also examine the variables related to the survival of QCs in an organization. An important question one may ask is why some QCs are able to solve problems and continue to prosper while others are not.

Finally, within the range of procedures investigated in the present study, the results of the present research show that upper-management support, circle initiation, and collar color have different patterns of impacts on the effectiveness of quality circles. However, further qualification of the findings may be warranted in view of the fact that no attempt was made to directly manipulate the three independent variables in the present study. Thus, caual assertions might be tempered. More research is needed before a firm conclusion can be made.

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Table 1

Means, Standard Deviations, and Correlations Among Variables

Variable	M	SD	2	3	4	5	6
1. Support (%)	73.22	13.61	-06	10	-18	25*	70***
2. Tenure (Days)	403.17	210.84		47***	07	38**	00
3. Quantity (No.)	3.09	2.65			-36**	29*	13
4. Speed (Days)	101.92	72.56				-34**	-30*
5. Initiation (Self=0, Other=1)							-02
6. Color (White=0, Blue=1)							

Note. N = 47. All decimals have been omitted for correlations. *p < .05, **p < .01, ***p < .001.

Table 2

The Amount of Time Required for QC Problem-Solving as a Function of Upper-Management Support and QC Initiation

Upper-Management Support	QC Initiation	
	Self	Management
High	102.37 (13)	72.60 (16)
Low	211.47 (5)	95.43 (13)

Note. Scores represent mean number of days elapsed between the choice of a QC project and the final management presentation. Cell ns are presented in parentheses. N = 47.

Table 3

The Amount of Time Required for QC Problem-Solving as a Function of Collar Color and QC Initiation

	QC Initiation	
Collar Color	Self	Management
White	260.00^{a} (4)	72.07^{c} (7)
Blue	96.29^{b} (14)	86.26^{bc} (22)

Note. Scores represent mean number of days elapsed between the choice of a QC project and the final management presentation. Cell ns are presented in parentheses. Means not sharing a common superscript are significantly different. N = 47.

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